



Utility of an obstacle-crossing test to classify future fallers and non-fallers at hospital discharge after stroke: A pilot study

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ABSTRACT

Background: Existing clinical assessments of balance and functional mobility have poor predictive accuracy for prospectively identifying post-stroke fallers, which may be due to a lack of ecological complexity that is typical of community-based fall incidents.

Research question: Does an obstacle-crossing test at hospital discharge predict fall status of ambulatory stroke survivors 3 months after discharge?

Methods: Ambulatory stroke survivors being discharged home completed an obstacle-crossing test at hospital discharge. Falls were tracked prospectively for 3 months after discharge. Logistic regression examined the relationship between obstacle-crossing at discharge (pass/fail) and fall status (faller/non-faller) at 3 months post discharge.

Results: 45 participants had discharge obstacle test and 3-month fall data. 21 (47 %) participants experienced at least one fall during follow-up, with 52 % of the falls occurring within the first month after discharge. Of the 21 fallers, 14 failed the obstacle-crossing test (67 % sensitivity). Among the 24 non-fallers, 20 passed the obstacle-crossing test (83 % specificity). The area under the receiver operating characteristic curve was 0.75 (95 % CI 0.60–0.90). Individuals who failed the obstacle-crossing test were 10.00 (95 % CI: 2.45–40.78) times more likely to fall in the first 3 months after discharge. The unadjusted logistic regression model correctly classified 76 % of the subjects. After adjusting for age, sex, days post stroke, and post-stroke disability, the odds ratio remained significant at 6.93 (95 % CI: 1.01–47.52) and correctly classified 79.5% of the participants.

Significance: The obstacle-crossing test may be a useful discharge assessment to identify ambulatory stroke survivors being discharged home who are likely to fall in the first 3 months post discharge. Modifications to improve the obstacle-crossing test sensitivity should be explored further.

1. Introduction

Ambulatory stroke survivors who are discharged home from the hospital fall at high rates [1,2], with 50 % of first falls occurring within the first 2 months [3]. Therefore, early and accurate identification of patients at risk of falling is critical to improve fall prevention. The Timed Up and Go test (TUG) and the Berg Balance Scale (BBS), both frequently used in inpatient rehabilitation, are only fair at predicting post-stroke fallers after hospital discharge (50 % and 63 % sensitivity, respectively) [1], possibly due to inadequate representation of the complex mobility situations in which stroke survivors fall. Walking-related falls

are common [4,5] and occur due to foot drag [4,6], falling over obstacles [7], or negotiating steps or stairs [7]. Indeed, community-dwelling stroke survivors who failed an obstacle-crossing task were more likely to fall in the following 6 months [8].

The ability to step over an obstacle may be a more accurate predictor of falls because it involves many of the recognized subsystems [9] of balance. Specifically, to step over an obstacle, *anticipatory postural adjustments* are needed to control the position of the center of mass prior to lifting each limb to clear the obstacle and *dynamic balance* maintains stability during single limb support. *Reactive postural adjustments* may be needed if the task of stepping over the obstacle disrupts normal

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anticipatory postural adjustments or dynamic balance in such a way that a loss of balance occurs. *Biomechanical capacity* (e.g., force generating capacity) is necessary to support the body during the task and for adequate limb shortening to clear the obstacle. Vision is critical for foot placement during the approach [10], but *sensory strategies* must be shifted to proprioceptive inputs for trail limb clearance.

The Functional Gait Assessment (FGA) and Dynamic Gait Index (DGI) are existing multi-item instruments that include stepping over an obstacle (one or two stacked shoeboxes). However, neither instrument has been evaluated for its ability to predict future post-stroke fallers before hospital discharge. This may be because their relatively lengthy administration is not feasible for many inpatient settings, or that the likelihood of a floor effect in more impaired/acute patients limits their utility. Eikenberry et al. [11] found that the DGI did not differentiate inpatients with stroke who did and did not fall during inpatient rehabilitation, possibly due to floor effects among both inpatient fallers and non-fallers (mean±SD: 3.3 ± 5.0 and 4.5 ± 6.2 out of 24 points, respectively).

The purpose of this study was to explore the potential utility of a single-item obstacle-crossing test with individually customized difficulty (height 10 % leg length) to predict future post-stroke fallers and non-fallers. Specifically, we examined the association between obstacle-crossing test performance (success/failure) at hospital discharge and fall status (faller/non-faller) at 3 months post discharge in ambulatory stroke survivors being discharged home. We hypothesized that people who failed the obstacle-crossing test would be more likely than those who passed the test to fall within the 3-month follow-up period.

2. Methods

2.1. Participants

Participants were recruited from acute care and inpatient rehabilitation hospitals. Eligible participants were 35–85 years old with an ischemic or hemorrhagic stroke, community-dwelling prior to stroke, able to walk for 10 m without assistance to advance the involved lower limb (assistive device and bracing allowed), able to follow multistep directions in English, and being discharged to home. Participants were excluded if they had a prior stroke with residual disability, pre-existing neurological conditions, pre-existing orthopedic conditions affecting gait, or a premorbid history of falls (≥ 2 in last 12 months) to help ensure that performance on the obstacle-crossing task was due to the impact of

stroke and not any other pre-existing condition or pre-stroke fall history. Institutional Review Board approval was obtained from each medical center. Participants provided written informed consent.

2.2. Procedures

Pre-discharge study procedures were conducted over two sessions, 1–3 days prior to hospital discharge. The Montreal Cognitive Assessment [12] and Patient Health Questionnaire (PHQ-9) [13] were used to characterize cognition and depression, respectively, and the Modified Rankin Scale [14] characterized disability at discharge. For the obstacle-crossing test, participants were instructed to walk at their comfortable speed (using any assistive device and/or bracing recommended at time of discharge), step over the obstacle, and continue walking. The obstacle, placed 5.5 m from gait initiation, was height-standardized at 10 % of the person's leg length (mean 8.8 cm, SD 0.5). The obstacle bar was 1.3 cm deep and 91.4 cm wide, plus approximately 8 cm on each side from the stacking blocks used to create the custom height (Fig. 1A). This width ensured individuals could not circumduct around the obstacle. For individuals using a walker, the obstacle bar width was modified (30.4 cm plus approximately 5 cm on each side from the stacking units) to fit within the walker frame. Although trail limb circumduction may have been possible with this set up (Fig. 1B), participants were explicitly instructed to step over and not to swing around the obstacle and no incidents of trail limb circumduction occurred (verified by video replay). While we believe these two set-ups created similar biomechanical stepping demands, we acknowledge the additional visual-navigation demands of approaching the obstacle with a walker and the greater stability afforded by bilateral upper extremity support during stepping. Participants were asked to complete 4 trials. A researcher walked alongside the participant, assisting only when needed for safety. Each trial was scored as “pass” or “fail”. A “pass” was recorded if the participant cleared the obstacle without contacting it or requiring assistance from the tester. A “fail” was recorded if the participant required assistance from the tester (regardless of clearance success) or contacted the obstacle. Types of failures were characterized using a 5-point scale (0–4) (Table 1). A person was rated as failing the test if they failed ≥ 1 trial. We set the threshold of a “fail” at ≥ 1 trial because we believe that even one failed trial is indicative of obstacle-crossing difficulty and suggests the possibility of a mishap in real life. Nonetheless, we explored additional thresholds (i.e., ≥ 2 trials) and found that false negatives were grossly inflated when a more

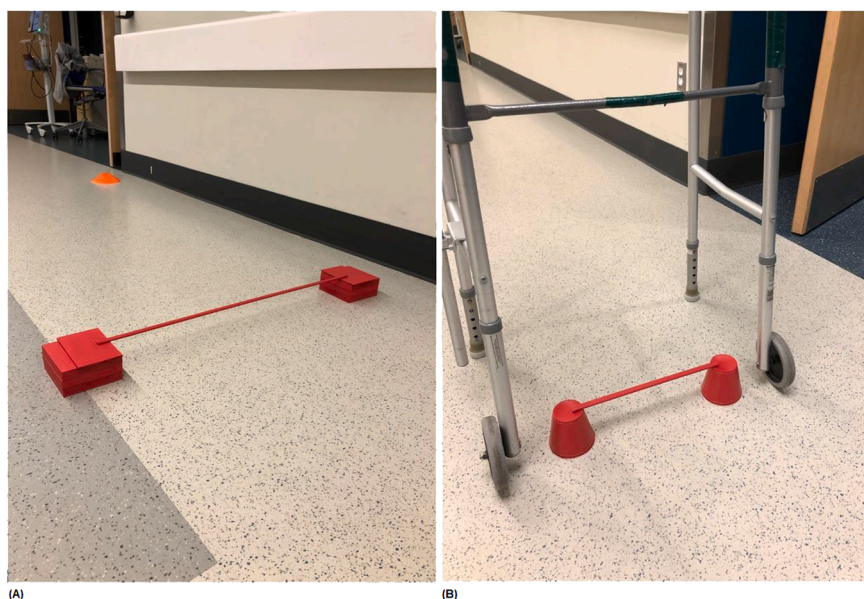


Fig. 1. Obstacle-crossing test set-up (A) for participants not using an assistive device or using a cane and (B) for participants using a walker. The average (\pm SD) height of the obstacle (customized to 10 % leg length) was 8.8 \pm 0.5 cm. The obstacle bar was 1.3 cm deep and 91.4 cm wide and sat upon stacked blocks creating additional width of approximately 8 cm on each side. The obstacle bar width was modified to fit between the legs of the walker (30.4 cm plus approximately 5 cm on each side from the stacking blocks), when needed, as illustrated in (B).

Table 1

Obstacle-crossing test scoring rubric and number of subjects scoring in each category grade. The score for each subject was the worst score across 4 trials.

Score	Category Definition	Rating	Subjects (n)
0	Clears obstacle without contact or stopping (may slow down)	Pass	24
1	Stops or appears unsteady but clears the obstacle successfully	Pass	3
2	Lightly contacts obstacle, obstacle remains in place	Fail	0
3	Knocks the obstacle, displacing it	Fail	6
4	Requires assistance to step over the obstacle or to recover balance (regardless of clearance success)	Fail	12

stringent definition of obstacle fail was applied.

At discharge we also assessed 5-m gait speed [15], 2-minute walk distance [16], 5-times sit-to-stand [17], the Step Test [18], the Activities-specific Balance Confidence (ABC) scale [19], and the Walking Impact Scale (Walk-12) [20]. Participants were provided with a 3-month fall and rehabilitation calendar and instructed to document any falls as well as therapy visits. A fall was defined as landing on the floor, ground, or other lower level due to an uncontrolled, unplanned, and non-purposeful descent that was not the result of a medical condition (e. g., orthostatic hypotension) or external force (e.g., push). Participants were instructed to call the researchers when they had a fall. Reminder/check-in phone calls were made every 2 weeks to maximize recall. Participants reporting ≥ 1 fall were classified as “fallers” [21].

2.3. Statistical analysis

Normality of continuous variables was assessed using the Shapiro-Wilk test. Differences between fallers and non-fallers and between individuals with obstacle fail and pass were compared using chi-square tests for categorical variables and one-way ANOVA for ordinal or continuous variables. Correlation between variables was measured with Spearman correlation matrices. A binary unadjusted logistic regression was used to examine the relationship between obstacle-crossing ability (fail/pass) at hospital discharge and fall status (faller/non-faller) at 3 months. A model was then adjusted for potential confounding factors of age, sex, days post stroke, and post-stroke disability [8,22]. Lastly, we examined physical performance and self-report variables for inclusion in the adjusted model. To preserve parsimony and prevent over-fitting, only covariates with a significant association ($p < 0.05$) with both fall status and obstacle crossing-ability were included in our final model [23]. Measures of association were odds ratio and relative risk. We estimated relative risk because our outcome is common ($> 10\%$) and in some cases the odds ratio can overestimate the relative risk [23,24]. To examine the discriminative ability of the obstacle test, we also calculated the sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC). Alpha was set at 0.05.

An a priori sample size estimation was conducted based on pilot data from 10 participants, where 50 % of participants had fallen during the 3-month follow-up and 29 % of participants who passed the obstacle test had experienced a fall. A sample size of 50 would have 80 % power to detect a significant (2-tailed, $\alpha=0.05$) minimum odds ratio of 5.4.

3. Results

3.1. Participants

Forty-five participants with fall data at 3 months were included in the analyses (Fig. 2, Table 2), 10 % ($n = 5$) short of our target ($n = 50$). Timeline constraints restricted further recruitment. Median age was 61 years (IQR 53–67). Median hospital length of stay (acute care plus acute inpatient rehabilitation) was 16 days (IQR 8–26). Six participants (13 %) had binocular visual acuity worse than 20/30; none had visual neglect.

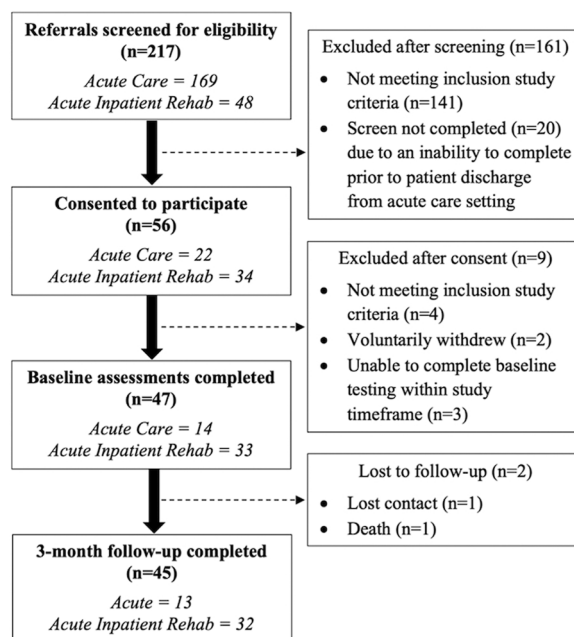


Fig. 2. Flow of participants through the study and reasons for loss to follow up.

3.2. Characteristics of fallers

Twenty-one participants (47 %) reported experiencing at least one fall in the 3-month follow-up. None discharged directly home from acute care experienced a fall. Compared to non-fallers, fallers had longer lengths of stay, more disability at discharge, and were more likely to be using an assistive device at discharge (Table 2). There were no differences between fallers and non-fallers for age, sex, years of education, race, type of stroke, side of hemiplegia, cognitive or language function, presence and severity of comorbidities, depression, or use of ankle bracing.

Of all fallers ($n = 21$), 9 participants (20 % of entire sample; 43 % of fallers) reported more than one fall (range 2–7). Of the 40 total falls, 5 falls resulted in injury and 2 falls required medical attention; none required hospitalization. Average time to first fall was 37 days (SD 25), with 52 % of first falls occurring within the first month. Most falls occurred while walking or transferring (95 %) at home (80 %), mostly indoors (88 %), while only 8 falls (20 %) occurred in the community.

3.3. Obstacle-crossing test performance and falls

Forty-two (93 %) participants completed all 4 trials ($n = 1$ completed 3 trials and $n = 2$ completed 2 trials due to fatigue). Of the 21 fallers, 14 (67 %) failed the obstacle-crossing test; two-thirds of fails were due to needing assistance (Table 1). All but one of the participants who failed did so in the first two attempts. Of the 24 non-fallers, 20 (83 %) passed the obstacle-crossing test. Thus, the test was 67% sensitive (95% CI 43–85) and 83 % specific (95 % CI 62–95). The AUC was 0.75, indicating acceptable discrimination [25], but the estimate lacks precision (95 % CI 0.60–0.90).

There was a significant association ($\chi^2 [1, n = 45] = 11.67, P = 0.001$) between the exposure (obstacle fail/success) and the outcome (faller/non-faller). The unadjusted binary logistic regression model correctly classified 76 % of subjects. Participants who failed the obstacle test were 10.00 (Odds Ratio [OR], 95 % CI 2.45–40.78) times more likely to fall in the first 3 months and had 3.00 (Relative Risk, 95 % CI 1.51–5.94) times the risk of falling than those who passed the test. After adjusting for age, sex, days post stroke, and post-stroke disability, the OR remained significant at 6.93 (95 % CI 1.01–47.52), with the adjusted model correctly classifying 79.5 % of participants. When

Table 2

Participant characteristics for all participants and for fallers and non-fallers. Values are count (proportion) or median (IQR).

Variable	All (n = 45)	Faller (n = 21)	Non-Faller (n = 24)	P value ^a
Age (years)	61 (53, 67)	61 (55, 66)	61 (51,67)	0.542
Male sex – number (%)	27 (60)	13 (62)	14 (58)	0.936
Education (years)	14 (12, 16)	14 (12, 16)	13 (12, 16)	0.236
Race - number (%)				0.681
White	22 (49)	12 (57)	10 (41)	–
Black	20 (45)	8 (38)	12 (50)	–
Asian	2 (4)	1 (5)	1 (4)	–
Other	1 (2)	0 (0)	1 (4)	–
Ischemic stroke – number (%)	35 (78)	16 (76)	19 (79)	0.631
Location of stroke - number (%)				0.694
Cortical	19 (42)	6 (29)	13 (54)	–
Subcortical	18 (40)	9 (43)	9 (38)	–
Brainstem	4 (9)	3 (14)	1 (4)	–
Mixed	4 (9)	3 (14)	1 (4)	–
Left Hemiplegia – number (%)	23 (51)	11 (52)	12 (50)	0.639
tPA received, yes – number (%)	13 (37)	3 (14)	9 (37)	0.079
Hospital LOS (days)	16 (8, 26)	25 (20, 32)	10 (2, 15)	< 0.001
Discharge MRS \geq 3 – number (%)	28 (62)	18 (86)	10 (42)	0.002
MoCA (score 0–30)	24 (22, 26)	26 (24, 27)	24 (20, 26)	0.051
PHQ-9 (score 0–27)	6 (2, 9)	7 (3, 10)	4 (1, 9)	0.174
Beside WAB, Aphasia Quotient (%)	100 (98, 100)	100 (99, 100)	100 (98,100)	0.550
CIRS-G Total (max=56)	12 (8, 15)	13 (9, 15)	11 (8, 14)	0.523
CIRS-G Severity Index	0.90 (0.60, 1.10)	0.90 (0.60, 1.10)	0.75 (0.60, 1.00)	0.333
Fell in hospital - number (%)	4 (9)	3 (14)	1 (4)	0.526
Using assistive device, yes – number (%)	28 (62)	17 (81)	11 (52)	0.015
Rolling walker	10 (22)	3 (14)	7 (29)	–
Standard walker	1 (2)	0 (0)	1 (4)	–
Quad cane	9 (20)	7 (33)	2 (8)	–
Straight cane	8 (18)	6 (29)	2 (8)	–
Using bracing, yes - number (%)	12 (27)	8 (38)	4 (17)	0.110
Solid ankle foot orthosis	9 (20)	7 (33)	2 (8)	–
Articulating ankle foot orthosis	1 (2)	1 (5)	0 (0)	–
Ankle splint	2 (4)	0 (0)	2 (8)	–

Abbreviations: tPA, tissue plasminogen activator; LOS, length of stay; MRS, Modified Rankin Scale; MoCA, Montreal Cognitive Assessment; PHQ-9, Physical Health Questionnaire-9; WAB, Western Aphasia Battery; CIRS-G, Cumulative Illness Rating Scale for Geriatrics.

^a P values are for differences between fallers and non-fallers using a one-way analysis of variance for continuous data, Pearson Chi-Square for categorical data, and Fisher's exact test for categorical data. P values in bold are significant at alpha < 0.05.

covariates for self-report (Walk-12) and physical performance (2-Minute Walk Test and Step Test paretic limb score) were added to the previous model, the OR remained significant at 5.50 (95 % CI 1.09–23.33), with the adjusted model correctly classifying 77.8 % of participants. Of the covariates entered, Walk-12 was the only significant variable.

Post-hoc exploratory analyses revealed that the 7 false negatives were largely driven by people using a walker during the task. Of the 11 participants who used a walker at discharge, 4 subsequently fell, but only 1 of the 4 fallers failed the obstacle test. Excluding individuals who used a walker, the obstacle test's predictive properties were slightly more accurate overall, yet still imprecise due to smaller sample size (n = 34): sensitivity 76 % (95 % CI 49–92), specificity 82 % (95 % CI 56–95), AUC 0.79 (95 % CI 0.64–0.95), OR 15.17 (95 % CI 2.83–81.09). Ten (22 %) participants wore an ankle-foot orthosis (AFO) during the obstacle test (all were also using a cane); 9/10 failed the obstacle test at discharge, 8/10 were fallers at 3 months; thus, only one person with an AFO was misclassified by the obstacle test. Of the 17 participants using a cane during the obstacle test, 76 % (n = 13) fell post-discharge, of whom 85 % (n = 11) had failed the obstacle test.

3.4. Physical performance tests and self-reported outcomes

Compared to non-fallers, fallers had lower balance confidence (ABC), higher self-reported impact of stroke on walking (Walk-12), slower 5-m gait speed, shorter 2-minute walk distance, fewer sit-to-stand repetitions per second, and fewer Step Test repetitions (Table 3).

4. Discussion

This study tested the hypothesis that a complex ecological mobility task (stepping over a custom-height obstacle) would accurately identify fallers and non-fallers in the first 3 months after discharge. Despite under-enrolling by 10 %, we found that ambulatory stroke survivors who failed at least one attempt of the obstacle-crossing test had significantly higher risk of falling after discharge. Only 3 participants could not complete all 4 trials, but our observation that 94 % of those who failed did so in the first 2 attempts suggests that only 2 trials may be needed. Our results further suggest that even 1 failure out of up to 4 attempts is sufficient to identify those likely to fall in the home or community after discharge.

The strong association between obstacle-crossing test performance at discharge and fall status at follow-up is consistent with previous research [8,26]. However, Said et al. [8] used a very low (4 cm) and thin (0.15 cm) obstacle and excluded individuals using assistive devices. Thus, the current study provides new evidence that our relatively more challenging and height-customized obstacle-crossing task is safe and feasible in a more acute and mobility-impaired post-stroke ambulatory population. Geerse et al. [26] found that obstacle-avoidance success rates for two-dimensional virtual obstacles could correctly classify prospective fallers with excellent accuracy, but the study included many individuals with a history of falling, with fall history contributing to the predictive model. Our three-dimensional obstacle does not require sophisticated technology and may be more easily adopted in clinical practice, while avoiding the floor effect of the very difficult obstacle-crossing item of the FGA and DGI.

Our finding that two-thirds of falls were due to needing assistance

Table 3

Self-report and physical performance measures for all participants and for fallers and non-fallers. Values are mean/median (SD/IQR). Between-group effect sizes are presented as Cohen's *d* for normally distributed variables and Cliff's δ for skewed variables.

Variable	All (n = 45)	Faller (n = 21)	Non-Faller (n = 24)	P value ^a	Effect Size ^b
ABC Scale (%)	64.9 (22.2)	57.8 (18.8)	71.2 (23.4)	0.041	<i>d</i> = 0.63
Walk-12 (%)	56.9 (27.0)	72.4 (19.7)	43.3 (25.3)	< 0.001	<i>d</i> = 1.28
5-m gait speed (m/s)	0.61 (0.34)	0.47 (0.24)	0.74 (0.36)	0.007	<i>d</i> = 0.86
2MWT distance (m)	85.7 (49.0)	64.2 (38.9)	102.8 (50.1)	0.009	<i>d</i> = 0.86
5x sit to stand (s)	22.5 (16.4, 28.5)	25.3 (18.6, 30.5)	18.0 (14.5, 27.8)	0.239	δ = 0.33
5x sit to stand (reps/s)	0.21 (0.12)	0.17 (0.10)	0.24 (0.12)	0.034	<i>d</i> = 0.66
Step Test (reps)					
Paretic limb	5 (0, 8)	0 (0, 5)	7 (5, 11)	< 0.001	δ = -0.62
Non-Paretic limb	6 (3, 9)	5 (0, 7)	8 (6, 13)	0.002	δ = -0.51
Summed total	11 (5, 17)	6 (0, 11)	14 (11, 24)	< 0.001	δ = -0.62

Abbreviations: ABC, Activities-specific Balance Confidence; Walk-12, Walking Impact Scale; 5-m gait speed, 5-meter gait speed; and 2MWT, 2-Minute Walk Test.

^a P values are differences between fallers and non-fallers determined using a one-way analysis of variance. P values are significant at an alpha level < 0.05.

^b Cohen's *d*: 0.2, 0.5 and 0.8 correspond to small, medium, and large effects; Cliff's δ ranges from -1 to +1 where values closer to ± 1 are larger effect sizes.

suggests that impaired reactive postural control may be a critical contributor to falls in subacute stroke. This is consistent with Mansfield et al. [5], who found that inability to recover by stepping, using a lean-and-release system, at the time of discharge from inpatient rehabilitation was associated with a 2.2 increase in the likelihood of falling in the 6 months following discharge. However, they also included some participants with a history of falls and not all participants completed the lean-and-release test. Indeed, compensatory stepping reactions are known to be too difficult for lower functioning patients with subacute stroke [27]. We did not have any participants who could not attempt the obstacle test at all. Thus, our obstacle test may provide sufficient postural control challenge without being too difficult.

Our data suggest that the obstacle test may be less accurate for predicting fallers among individuals who use a walker. Indeed, performing the task with bilateral upper limb support afforded by the walker alters the dynamic balance demands and may have impacted the visuo-perceptual demands of the task by requiring more precise navigation in obstacle approach. Despite these differences, the set-ups provided similar biomechanical stepping demands. Unfortunately, we do not know if the fallers who were using a walker at discharge fell post-discharge because they were not using their walker. Assistive device use at the time of falling will be important information to gather in future studies. Prediction accuracy was not affected by use of an AFO or a cane, but the sample size of non-fallers who used a cane (*n* = 4) or wore an AFO (*n* = 2) was very small. Thus, whether assistive device use moderates the association between obstacle test and fall status needs further investigation.

The accuracy of the obstacle test to classify fall status based on AUC was 0.75 (95 % CI 0.60–0.90). By comparison, smaller AUCs for classification of fallers/non-fallers have been reported in chronic stroke for the TUG (AUC 0.66, 95 % CI 0.57–0.75) [28] and the Mini-BESTest (AUC 0.64, 95 % CI 0.51–0.77) [29]. Although the overlap in the confidence intervals between the reported AUCs and differences in stroke

chronicity preclude inferences regarding superiority, the obstacle-crossing test appears to have very good discriminatory ability [25]. Direct head-to-head comparisons with other instruments are needed.

We need to acknowledge several limitations. There were no fallers discharged from acute care, which, if confirmed in a larger sample, may indicate that acute care screening is not needed. We examined only one type of obstacle. It is possible that predictive accuracy may be improved by altering the parameters of the obstacle (e.g., increased depth). A further limitation is the imprecision of the odds ratio and AUC estimates, which prevents immediate recommendations for use in practice. We based our sample size calculation on a minimum OR of 5.4, which we believed would be clinically important; however, it has been suggested that sample size for studies of likelihood of disease (in our case, falls) should be calculated using the confidence interval around the likelihood ratio [30]. Nonetheless, our statistically significant findings and promising point estimates support further investigation. The question of how the obstacle test should be adapted for individuals using a walker and whether they need to be considered a separate subpopulation for assessing predictive properties of the test must be considered. While the selection criteria were minimally restrictive to be as representative as possible of ambulatory stroke survivors being discharged home, the external validity is nonetheless limited accordingly.

5. Conclusions

An obstacle-crossing test administered at hospital discharge may be an accurate predictor of post-stroke fallers in the first 3 months post discharge. The simple obstacle-crossing test is safe, feasible, and pragmatic for routine use with ambulatory stroke survivors at inpatient discharge. Modifications to the task should be explored to identify obstacle dimensions that optimize test sensitivity and specificity.

Conflict of Interest Statement

The authors have no conflicts of interest to report.

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